REMARKS

Entry of the foregoing, reexamination and reconsideration of the above-identified application are respectfully requested.

Claim 1 has been amended to recite that the acyltransferase transfers an aromatic acyl group to the glucose of the 3 or 5 position of anthocyanin. This language appears in other claims, e.g., claims 46-52, and does not raise any new issues or add new matter. Claim 53 has been canceled, as it was a substantial duplicate of claim 1. Claim 55 was amended to now depend from claim 54. Claim 52 has been amended to correct the claim dependency. Claim 54 has been amended to correct the antecedent basis. No new issues are raised by these amendments, nor is any new matter added. Entry of these amendments is thus believed to be consistent with 37 C.F.R. §1.116.

Claims 52, 54 and 59-67 have been rejected under 35 U.S.C. §112, second paragraph, as allegedly being indefinite. This rejection is now moot in view of the instant amendment. The claims have been amended to correct the claim dependency in claim 52 and correct the antecedent basis in claim 54.

Withdrawal of this rejection is respectfully requested and believed to be in order.

Claims 1-3, 5-12, 20, 22-41 and 47-52 have been rejected under 35 U.S.C. §112, first paragraph, as the specification allegedly fails to provide written description for the invention as claimed. This rejection is respectfully traversed.

The claims are said to "encompass a multitude of polynucleotides from a multitude of sources encoding a multitude of anthocyanin acyltransferase." In addition, a "core

structure common to said multigene family which would allow a skilled artisan to visualize the identity of the species within the genus" is allegedly not defined. The Official Action thus asserts that "the disclosure of a few genes from related plant species would not provide adequate written description for the claimed genus, namely, an isolated polynucleotide from any source encoding anthocyanin acyl transferase, absent more."

The instant application describes the cloning of many cDNA's which encode an enzyme having an aromatic acyl group transfer activity, as well as the cDNA's which have been cloned. For example, in Example 6 of the instant application, a cDNA of gentian origin is described; in Example 8, cDNA of petunia origin is disclosed; and in Example 20, cDNA of lavender origin is disclosed. The cDNA's disclosed in Examples 6, 8 and 20 were obtained using a hybridization method, which is described in the specification (*see, e.g.*, page 5, line 31 - page 6, line 24), to select desired cDNA. Example 11 describes a cDNA of Perilla origin and Example 12 describes a cDNA of cineraria origin. The cDNA's of both Examples 11 and 12 were obtained by using synthetic DNA primers.

At page 9, ln. 37 - page 10, ln. 29, the specification describes that by using the cDNAs specifically described in the specification, other cDNAs of acyltransferases can be obtained. Moreover, comparing the various cDNAs obtained, a region of conserved amino acid sequence was observed. *See,* SEQ ID NO: 21. A "core structure common to said multigene family which would allow a skilled artisan to visualize the identity of the species within the genus," is thus described. One skilled in the art could also compare the various amino acid sequences to determine any additional areas of conserved sequence. Since the

amino acid sequences of many different species are provided, one skilled in the art could readily review the various sequences and determine whether additionally obtained species contain regions found to be conserved amongst species.

A specification may, within the meaning of 35 U.S.C. §112, first paragraph, contain a written description of a broadly claimed invention without describing all species. *Utter v. Hiraga*, 6 USPQ2d 1709, 1714 (Fed. Cir. 1988). Applicants have described the amino acid sequences of numerous proteins as claimed, from various species, which they have isolated using the method described in the specification. Applicants have described how one skilled in the art would obtain a protein having aromatic acyl transferase activity, as claimed. The application further shows that the described methods do result in finding a protein that falls within the scope of the claims. The description provided in the specification are sufficient for purposes of the written description requirement of 35 U.S.C. § 112, first paragraph. Thus, the application provides written description support for the subject matter claimed.

The Official Action further states that not all polynucleotide comprising SEQ ID NO:22 or encoding a protein comprising SEQ ID NO:21 are anthocyanin acyltransferases, and that polynucleotide produces using such sequences as primers or that hybridize to the primer and do not encode an anthocyanin acyltransferase are not described in the specification. These assertions are believed to be irrelevant. As recited in claim 1 and in dependent claims, for example, an acyltransferase "transfers an aromatic acyl group to the glucose of the 3 or 5 position of anthocyanin." One skilled in the art could readily

evaluate polynucleotides obtained in accordance with the teachings of the specification and evaluate, also based upon teachings of the specification, whether they encode an anthocyanin acyltransferase as instantly claimed.

Applicants thus teach several species falling within the scope of the claimed genus. In addition, applicants teach how to obtain and evaluate species and teach conserved sequences for the claimed species. These teachings show applicants were in possession of the claimed genus. The specification thus describes the claimed genus.

Applicants note that the recitation of "complementary" in claims 28-41 allegedly has no basis in the specification and is deemed "new matter." This assertion is believed to be in error. Based upon biological principles of coding and complementary strands of DNA, we believe that one skilled in the art would understand that the claimed sequence must be "complementary." A nucleotide sequence which hybridizes with the nucleotide sequences which encode the amino acid sequences of SEQ ID NOs: 1-6 would not encode an anthocyanin acyltransferase. Instead, the hybridizing sequence would be complementary to the coding sequence for the acyltransferase. Likewise, one skilled in the art would recognize that what hybridizes with the complementary sequence of SEQ ID NOs: 1-6 would be the coding sequence for an anthocyanin acyltransferase. No new matter is presented by this recitation since the test to evaluate new matter is based upon what would be apparent to a person "skilled in the art."

In light of the above remarks, applicants respectfully request withdrawal of this rejection under 35 U.S.C. § 112, first paragraph.

Claims 1-3, 5-12, 20 and 22-41 have been rejected under 35 U.S.C. §112, first paragraph, as allegedly not being enabled by the specification. This rejection is respectfully traversed.

The Official Action acknowledges that the specification enables isolated polynucleotide sequences of SEQ ID NOs:1-6 encoding an anthocyanin acyltransferase, transgenic plant or plant parts expressing same and methods of expressing said sequences to alter a pigment in a plant. However, the specification allegedly fails to enable any polynucleotide from any source encoding anthocyanin acyltransferase or polynucleotides amplified using SEQ ID NO:22 or a nucleotide sequence encoding SEQ ID NO:21 as a primer or a polynucleotide that hybridizes to the primer under specified hybridization conditions of claims 5 and 6. These assertions are believed to be in error.

In the instant application, applicants teach how one skilled in the art could obtain proteins which have aromatic acyl group transfer activity, as claimed. As discussed on pages 5 and 6 of the specification, prior to the present invention all attempts to purify aromatic acyltransferases had failed. The inventors were the first to succeed in purifying this enzyme using various chromatographic techniques. The DNA obtained was sequenced, and then used as a probe. Using the teachings of the specification, for example, at page 5, line 31 - page 6, line 24. DNA encoding the amino acid sequences of SEQ ID NOs: 1-6 were thus obtained. Using the known DNA as probes, and recognizing the conserved regions (*see, e.g.,* SEQ ID NOs: 21 and 22), additional DNA falling within the scope of the claims can be obtained, as described at the very least at pages 9-10. By

using this method, one of skill in the art can thus isolate proteins which have aromatic acyl group transfer activity, as recited in the claims.

For example, using the amino acid sequence, one could develop a number of primers which could be used to amplify cDNA's from a cDNA library. Given that the genetic code is degenerative, one would have to develop a number of primers going in each direction (to cover all possible combinations of nucleic acids which would encode the amino acid segment). Using all possible combinations of the primers from each primer set (one set forward primer, one set reverse) one of skill in the art would then perform PCR on cDNAs from a cDNA library. Any cDNA determined to have been amplified would then be further analyzed by sequencing to determine if the cDNA encodes the isolated protein.

At page 9, line 36 - page 10, line 29, the specification discloses how to purify acyltransferase from one of the species specifically described in the specification and then use that acyltransferase to obtain an antibody against the enzyme, clone cDNA or chromosomal DNA which produces a protein capable of reacting with the antibody. Other aromatic acyltransferases in addition to the species specified in the application can thus be obtained by one skilled in the art based upon the description in the specification.

For example, in Example 6 the applicants describe cDNA of gentian origin; in Example 8, cDNA of petunia origin is disclosed; and in Example 20, cDNA of lavender origin is disclosed. The cDNA's disclosed in Examples 6, 8 and 20 were obtained using a hybridization method as described in the specification to select desired cDNA. Example 11

describes a cDNA of perilla origin and Example 12 describes a cDNA of cineraria origin. The cDNA's of both Examples 11 and 12 were obtained by using synthetic DNA primers.

One of skill in the art could obtain a protein having an aromatic acyl group transfer activity of any origin using the methods described in the specification, e.g., pages 5-6, page 9, line 36 - page 10, line 29, and Examples 6, 8, 11, 12 and 20. Example 3(6) teaches the probe which is used in Examples 6 and 8 to obtain a protein with aromatic acyl group transfer activity. Example 20 uses the same hybridization method as that taught in Example 3, but with a different flower species (i.e., *lavandula angustifolia* as opposed to *petunia hygrida* or *gentian*).

In Example 11, the applicants compared amino acid sequences from the proteins obtained in Examples 3, 6 and 8, and determined that a amino acid sequence was conserved between these proteins. They used this sequence to produce a primer which will amplify aromatic acyl transfer genes. The applicants next used this primer to amplify DNA from a cDNA library developed from perillas, and obtained a protein with aromatic acyl group transfer activity. In Example 12, the primer was also used to screen for genes in *Senecio cruentus*. Thus, the applicants have shown that this protein has a conserved region which is found in all of the flower species discussed in the specification, and primers from this conserved region can be used to isolate proteins from other flower species.

These steps are all readily known and easily practiced by those skilled in the art. Enablement is not precluded by the necessity for some experimentation. However,

experimentation needed to practice the invention must not be undue experimentation. The "key" word is undue, not experimentation. Although this may require a good deal of experimentation, the experimentation would not be undue to one of skill in the art. In fact, this type of experimentation would be commonplace for one of skill in the art. Therefore, it is believed that the claims are enabled by the specification, given what is known to one of skill in the art.

It is noted that claim 1 has been amended so that the acyltransferase encompassed by the instant claims are those that transfer "an aromatic acyl group to the glucose of the 3 or 5 position of anthocyanin."

With respect to claims 54-67, these claims are believed to be allowable. These claims are directed to the polynucleotides encoding the amino acid sequences of SEQ ID NOs: 1-6, as given in the specification. It is noted that claim 55 inadvertently depended from claim 53 rather than claim 54. This inadvertent error has been corrected by the instant amendment. All of claims 54-67 thus recite the amino acid sequences of SEQ ID NOs: 1-6. At the very least, these claims are thus enabled and described by the specification.

In view of the above, withdrawal of the rejection of record is respectfully requested, and believed to be in order.

It is respectfully submitted that all rejections have been overcome by the above amendments. Thus, a Notice of Allowance is respectfully requested.

In the event that there are any questions relating to this amendment or the application in general, it would be appreciated if the Examiner would contact the undersigned attorney by telephone at (650) 622-2360 so that prosecution of the application may be expedited.

Respectfully submitted,

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